

Appln No. 10/731,710
Amdt date August 7, 2007
Reply to Office action of June 7, 2007

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please amend claims 1, 5, 21, 23, 24 and 34 as follows:

1. (Currently Amended) A method for forming an ultra hard layer, comprising:
providing a refractory metal enclosure having an inner peripheral surface;
disposing a metallic liner within said enclosure;
placing ultra hard material within said enclosure, wherein at least a portion of said metallic liner is sandwiched between said ultra hard material and said inner peripheral surface;
sintering to convert said ultra hard material to a solid ultra hard material layer, having a peripheral portion infiltrated by said metallic liner; and
removing a majority said peripheral portion.
2. (Original) The method as in claim 1, wherein said refractory metal enclosure is formed of at least one of Nb, Mo, Ta, and other members of the IVB, VB and VIB families of the periodic table.
3. (Original) The method as in claim 1, wherein said metallic liner is formed of at least one of Fe, Co, and Ni.
4. (Previously Presented) The method as in claim 1, wherein disposing comprises forming an annular surface with the metallic liner and disposing said annular surface adjacent to the inner peripheral surface.

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5. (Currently Amended) The method as in claim 1, wherein disposing a metallic liner comprises disposing the metallic liner adjacent said inner peripheral [[wall]] surface, wherein said liner defines an annular surface surrounding said ultra hard material.

6. (Original) The method as in claim 1, further comprising disposing a substrate material within said enclosure such that said sintering bonds said substrate to said ultra hard material layer.

7. (Previously Presented) The method as in claim 6 during sintering the liner and at least a compound of the ultra hard material form a eutectic having a melting temperature lower than a melting temperature of a eutectic of the substrate material.

8. (Previously Presented) The method as in claim 6 during sintering the liner and at least a compound of the ultra hard material and the enclosure form a eutectic having a melting temperature about the same as that of a eutectic the substrate material.

9. (Previously Presented) The method as in claim 6 during sintering the liner and at least a compound of the ultra hard material and the enclosure form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C.

10. (Previously Presented) The method as in claim 1, wherein said disposing ultra hard material comprises disposing diamond material within said enclosure.

11. (Previously Presented) The method as in claim 1, wherein said disposing ultra hard material comprises disposing cubic boron nitride material within said enclosure.

12. (Cancelled).

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13. (Original) The method as in claim 1, wherein said solid ultra hard layer includes a peripheral edge, said metallic liner includes a metallic material and said sintering causes said metallic material to infiltrate a portion of said ultra hard layer extending no further than 500 microns inward from said peripheral edge.

14. (Original) The method as in claim 1, wherein said sintering produces said ultra hard material layer to be substantially free of fractures, chips and cracks.

15. (Previously Presented) The method as in claim 1 during sintering the liner and at least a compound of the ultra hard material and the enclosure form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C.

16. (Original) The method as in claim 1, further comprising joining said ultra hard layer to a substrate to form a cutting element, and mounting said cutting element on a bit body.

17. (Previously Presented) The method as in claim 1, wherein said disposing a metallic liner within said enclosure comprises providing a strip of said metallic liner having opposed ends and spot welding said opposed ends to each other to produce an annular shape.

18. (Original) The method as in claim 1, wherein the liner is in the form selected from the group of forms consisting of foils, rings, tubes, pastes, coatings, sputterings, and slurries.

19. (Original) The method as in claim 1, wherein the liner forms a continuous peripheral layer around the entire periphery of the enclosure.

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20. (Original) The method as in claim 1, wherein disposing comprises disposing a metallic liner having a melting temperature lower than the melting temperature of the enclosure.

21. (Currently Amended) A method for forming an ultra hard layer, comprising:
providing a refractory metal enclosure having an inner peripheral surface;
disposing a metallic liner within said enclosure;
placing ultra hard material within said enclosure, wherein at least a portion of said metallic liner is sandwiched between said ultra hard material and said inner peripheral surface;
placing a substrate material within said enclosure over the ultra hard material, wherein the substrate material is different from a material forming the liner; and
sintering to convert said ultra hard material to a solid ultra hard layer, wherein during sintering the liner forms a eutectic having a melting temperature and wherein the substrate forms a eutectic having a melting temperature, wherein the melting temperature of the liner formed eutectic is within 310° C of the substrate formed eutectic.

22. (Previously Presented) The method as in claim 21 wherein during sintering, the liner and at least a compound of the ultra hard material form a eutectic having a melting temperature about the same as that of a eutectic of the substrate material.

23. (Currently Amended) A method for forming an ultra hard layer, comprising:
providing a refractory metal enclosure having an inner peripheral surface;
disposing a liner within said enclosure;
placing ultra hard material within said enclosure, wherein at least a portion of said metallic liner is sandwiched between said ultra hard material and said inner peripheral surface;
[[and]]
sintering to convert said ultra hard material to a solid ultra hard layer, wherein during sintering the liner forms a plastically deformable region for preventing the formation of cracks

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on the ultra hard material adjacent said plastically deformable region during a cooling phase of said sintering; and

removing said region.

24. (Currently Amended) The method as in claim 23 further comprising placing a substrate material within the enclosure, wherein said substrate material is a different from a material forming said liner, wherein during sintering, the liner, the enclosure and a compound of the ultra hard material form a eutectic having a melting temperature lower than a melting temperature of a eutectic of the substrate material.

25. (Previously Presented) The method as in claim 23 further comprising placing a substrate material within the enclosure, wherein during sintering, the liner, the enclosure and a compound of the ultra hard material form a eutectic having a melting temperature about the same as that of a eutectic of the substrate material.

26. (Previously Presented) The method as in claim 23 wherein during sintering, the liner, the enclosure and a compound of the ultra hard material form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C.

27. (Previously Presented) The method as recited in claim 1 wherein the liner does not include carbide.

28. (Previously Presented) The method as recited in claim 1 wherein sintering converts said ultra hard material together with said liner to a solid ultra hard material layer.

29. (Previously Presented) The method as recited in claim 21 wherein the substrate comprises tungsten carbide.

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30. (Previously Presented) The method as recited in claim 21 wherein a melting temperature of a eutectic formed during sintering between the liner, a compound of the ultra hard material, and the enclosure is in the range of about 1100°C to about 1410°C.

31. (Previously Presented) The method as recited in claim 21 wherein the liner does not include carbide.

32. (Previously Presented) The method as in claim 21, wherein said metallic liner is formed of at least one of Fe, Co, and Ni.

33. (Previously Presented) The method as recited in claim 23 wherein the liner does not include carbide.

34. (Currently Amended) A method for forming an ultra hard layer, comprising:

providing a refractory metal enclosure having an inner peripheral surface;
disposing a liner within said enclosure having a thickness in the range of 0.005 mm to 3 mm;

placing ultra hard material within said liner, wherein at least a portion of said metallic liner is sandwiched between said ultra hard material and said peripheral surface; [[and]]

sintering to convert said ultra hard material together with said liner to a solid ultra hard material layer, wherein during sintering a peripheral portion of said ultra hard material is infiltrated by a material forming said liner; and

removing a majority of said peripheral portion.

35. (Cancelled).

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36. (Previously Presented) The method as recited in claim 4 wherein forming said annular surface comprises forming said annular surface by punching said metallic liner.